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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SANGHAVI, HEMANG

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 03/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

*SUPPLEMENTAL*  
**Office Action Summary**

Application No.

09/819,520

Applicant(s)

LIU ET AL.

Examiner

Hemang Sanghavi

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-17 is/are allowed.
- 6) ☒ Claim(s) 1-12 and 18-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Claim Objections***

Claim 13 is objected to because of the following informalities: In line 2 of claim 13, "a" should be deleted before the term "first, second and third". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5, 10, 18-20, and 23-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Weber et al (US 6,084,992).

Weber et al discloses a routing device (Fig. 2) comprising first and second multi-mode interference (MMI) coupling devices disposed in a semiconductor substrate, each of the first and second MMI coupling devices including first and second input and first and second outputs; and the first and second MMI coupling devices are coupled with a plurality of waveguides having different path lengths. See columns 6-8 and Fig. 2.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weber et al.

Weber et al, as discussed above, fails to explicitly disclose the MMI coupling device with silicon channels and oxide cladding disposed in the semiconductor substrate.

However, in lines 14-25 of column 10, Weber et al discloses AlGaAs/GaAs or InGaAsP/InP based semiconductor materials for the router. In lines 26-30 of column 10, Weber teaches that the materials such as SiO<sub>2</sub>/Si can be selected. Also, such materials are well known to form optical waveguides with silicon channels and oxide cladding.

From collective teachings of Weber et al and available well-known knowledge, the ordinary artisan would have found it to be obvious design choice at the time of the

invention to choose silicon material for the channels and silicon oxide for the cladding for the purpose of advantageously providing an efficient desired integrated MMI routing device.

Claims 11-12, 21-22, and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weber et al and Lagali et al (US 6,222,955).

Weber et al, as discussed above, fails to disclose an optical switch before the first MMI coupling device or after the second MMI coupling device to arrive at the invention of claims 11-12, 21-22, and 28-29.

Lagali et al, in a related art, discloses an integrated optical switch with MMI coupling devices to routing a beam of light from input ports to selected output ports.

Such switching configuration would provide selective routing of the channels in the MMI coupling device.

From collective teachings of Lagali et al, the ordinary artisan would have found it to be obvious at the time of the invention to provide a switch coupled to the first MMI coupling device or the second MMI coupling device for the purpose of advantageously routing channel at desired output ports, which is highly desirable in optical communication systems.

***Allowable Subject Matter***

Claims 13-17 are allowed over the prior art of record. The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to disclose or suggest the claimed optical apparatus including first, second, and third

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optical interleavers, each of the first, second and third interleavers including first and second MMI coupling devices with the claimed coupling arrangements.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Leuthold et al, Augustsson, Whiteaway et al, Madsen, Amersfoort et al, and Tayag et al disclose different types of MMI coupling arrangements. Madsen et al and Saida et al disclose MMI coupling arrangement including an optical switch.

The prior art submitted by applicant has been considered. See attached copy of form PTO-1449.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hemang Sanghavi whose telephone number is 703-305-3484. The examiner can normally be reached on Monday-Thursday (8:30 AM-6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 703-308-4819. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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A handwritten signature in black ink, appearing to read 'Hemang Sanghavi', with a long horizontal flourish extending to the right.

Hemang Sanghavi  
Primary Examiner  
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